PHYSICS OF THE COSMOS
PROGRAM ANALYSIS GROUP

REPORT TO THE APAC

GRANT TREMBLAY
PHYSPAG EC CHAIR

17 OCTOBER 2022

PHYSICS OF THE COSMOS
PROGRAM ANALYSIS GROUP

The 2022 **PhysPAG Executive Committee**

Chair	Grant **Tremblay**	Smithsonian Astrophysical Observatory
Vice Chair	Justin **Finke**	U.S. Naval Research Laboratory
Chair Emeritus	Ryan **Hickox**	Dartmouth College
	Sean **McWilliams**	West Virginia University
	Bindu **Rani**	NASA Goddard Space Flight Center / SURA / KASI
	Vera **Gluscevic**	University of Southern California
	Andrew **Romero-Wolf**	Jet Propulsion Laboratory
New Members!	Eric **Burns**	Louisiana State University
	Kristin **Madsen**	UMBC / NASA Goddard Space Flight Center
	Athina **Meli**	North Carolina Agricultural & Technical State Univ.
	David **Pooley**	Trinity University

PhysCOS **NASA Colleagues**

PS	Valerie **Connaughton**	
DPS	Sanaz **Vahidinia**	
CS	**Francesca Civano**	**Welcome Francesca!** 🚀
	Brian **Humensky**	**New!**

Currently Active **Science Interest Groups**

X-ray SIG
Gravitational Wave SIG
Gamma Ray SIG
Cosmic Ray SIG
Cosmic Structure SIG
Inflation Probe SIG — Reworking in process

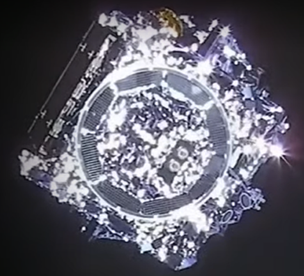
PhysPAG Activities (since the Summer 2022 APAC)

Three new SAGs recommended by APAC, now pending APD Approval

New Great Observatories SAG, Gamma-ray Transient Network SAG, Expanding Participation in Astronomy (AWESOM) SAG.

Planning for upcoming SACNAS, NSBP, and AAS 241 Meetings

New Great Observatories SAG Splinter, XRSIG, CRSIG, GRSIG, PhysPAG Town Hall, & Joint PAG Splinters Approved



Regular Executive Committee, SIG, and EC Chair Meetings

Expanded Cross-PAG coordination between ECs

Cross-PAG Discusson on fostering community interaction with GOMaP

CMB Community discussion to re-integrate (or rebrand) IP SIG underway

Three new SAGs recommended by APAC, now pending Mark's approval

THE NEW GREAT OBSERVATORIES SCIENCE ANALYSIS GROUP

GAMMA RAY TRANSIENT NETWORK SCIENCE ANALYSIS GROUP

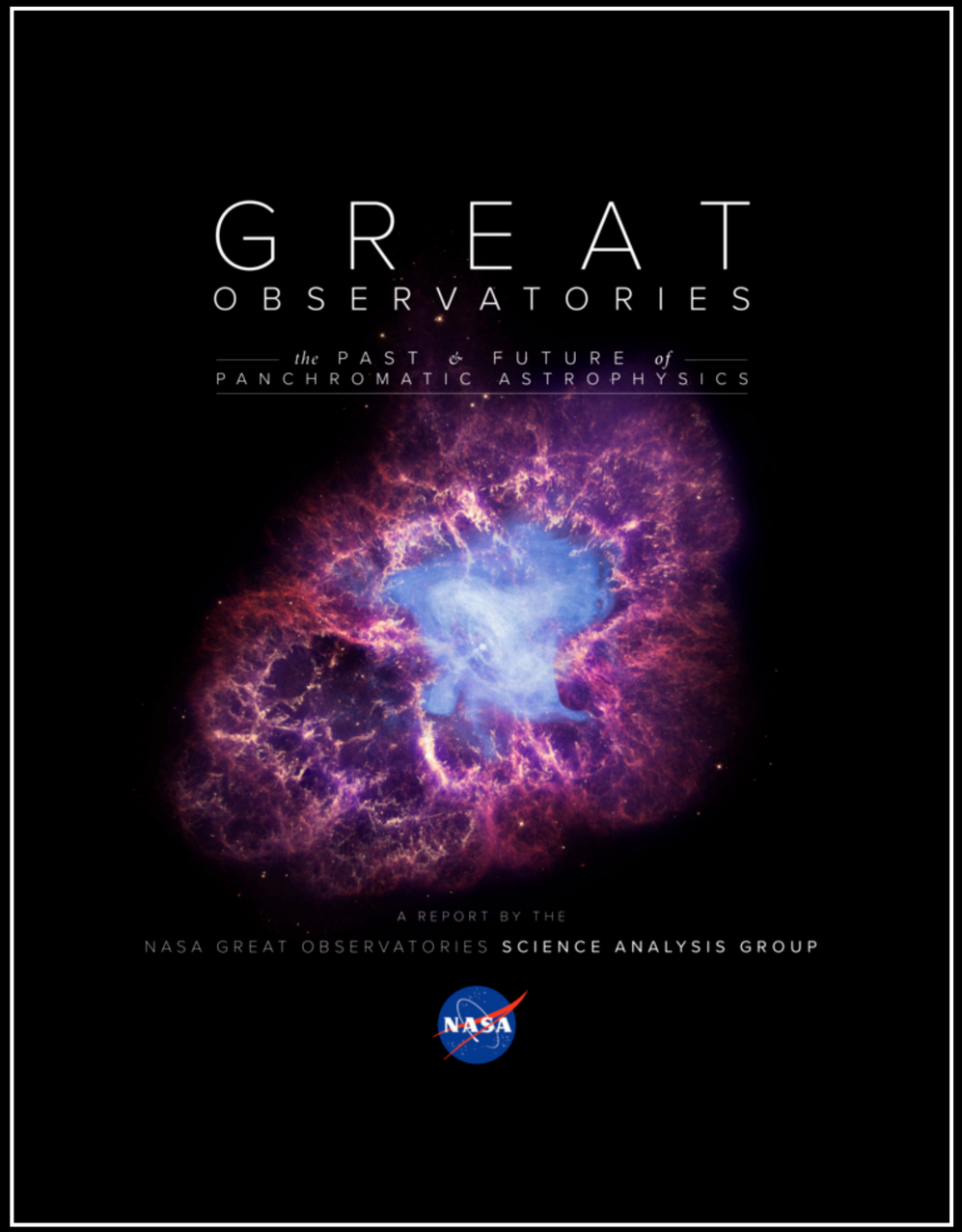
ASTROPHYSICS WITH EQUITY SURMOUNTING OBSTACLES TO MEMBERSHIP SCIENCE ANALYSIS GROUP

THE NEW GREAT OBSERVATORIES SCIENCE ANALYSIS GROUP

A proposed **Cross-PAG SAG** on scientific advances enabled by a **fleet** of future Great Observatories

Pending Mark's approval, we are **ready to recruit SAG membership *now*, including co-Chair(s)**

We envision structuring the report around the ~80 Key Science Questions and ~10 Discovery Areas of Astro2020, although the ultimate structure will be decided by the SAG, partially organically!



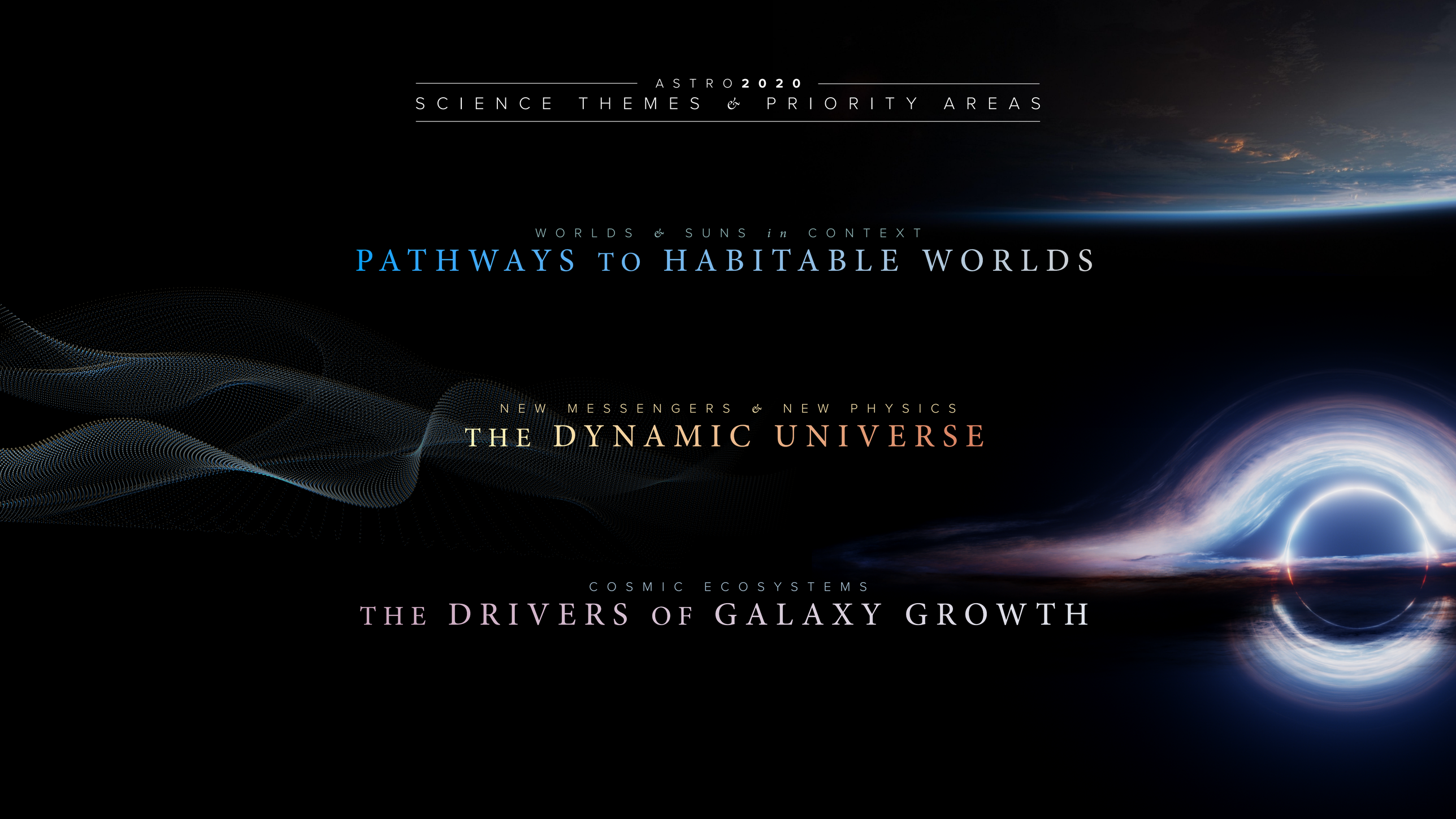
The NASA *GREAT OBSERVATORIES* **Science Analysis Group Report**, heavily cited by Astro2020, provides an account of how these four missions changed our country, the world, and our understanding of everything beyond it.

READ THE REPORT NOW

WWW.GREATOBSERVATORIES.ORG

ASTRO 2020

SCIENCE THEMES & PRIORITY AREAS



WORLDS & SUNS *in* CONTEXT

PATHWAYS TO HABITABLE WORLDS

NEW MESSENGERS & NEW PHYSICS

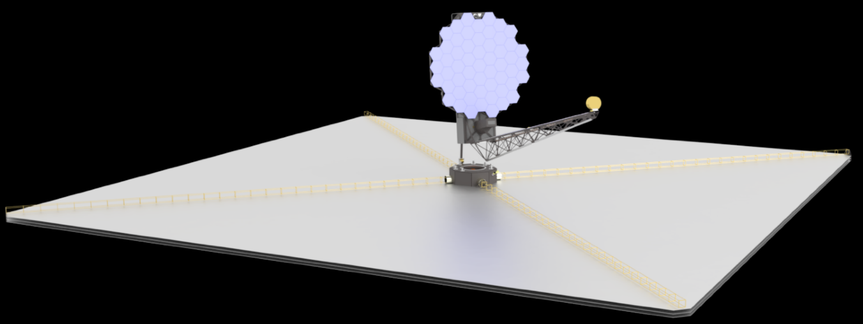
THE DYNAMIC UNIVERSE

COSMIC ECOSYSTEMS

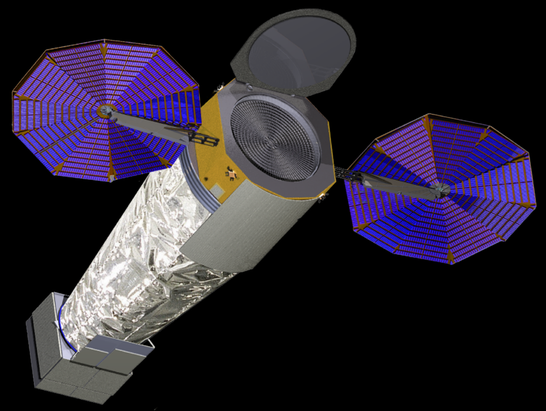
THE DRIVERS OF GALAXY GROWTH

THREE GREAT PURSUITS. THREE GREAT OBSERVATORIES

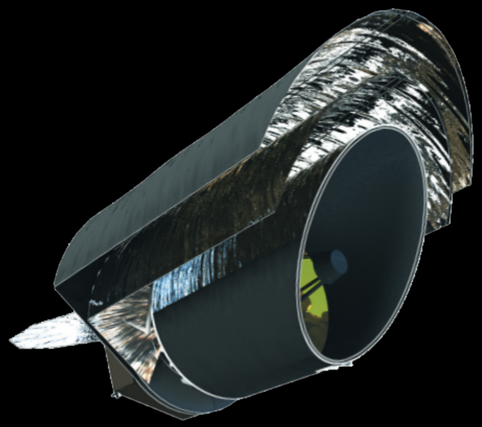
ARE WE ALONE?



HOW DOES THE UNIVERSE WORK?



HOW DID WE GET HERE?



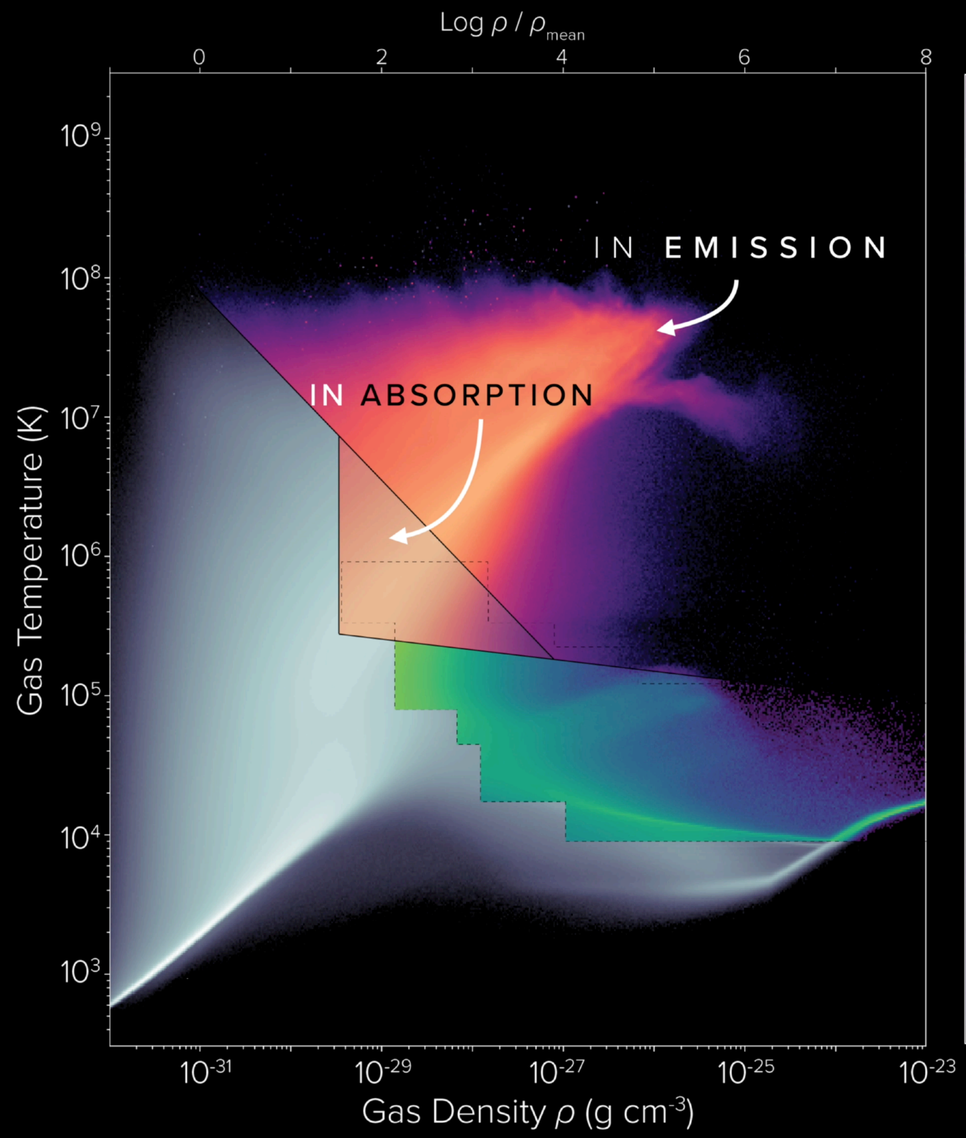
ALL ARCHITECHTURES NOTIONAL

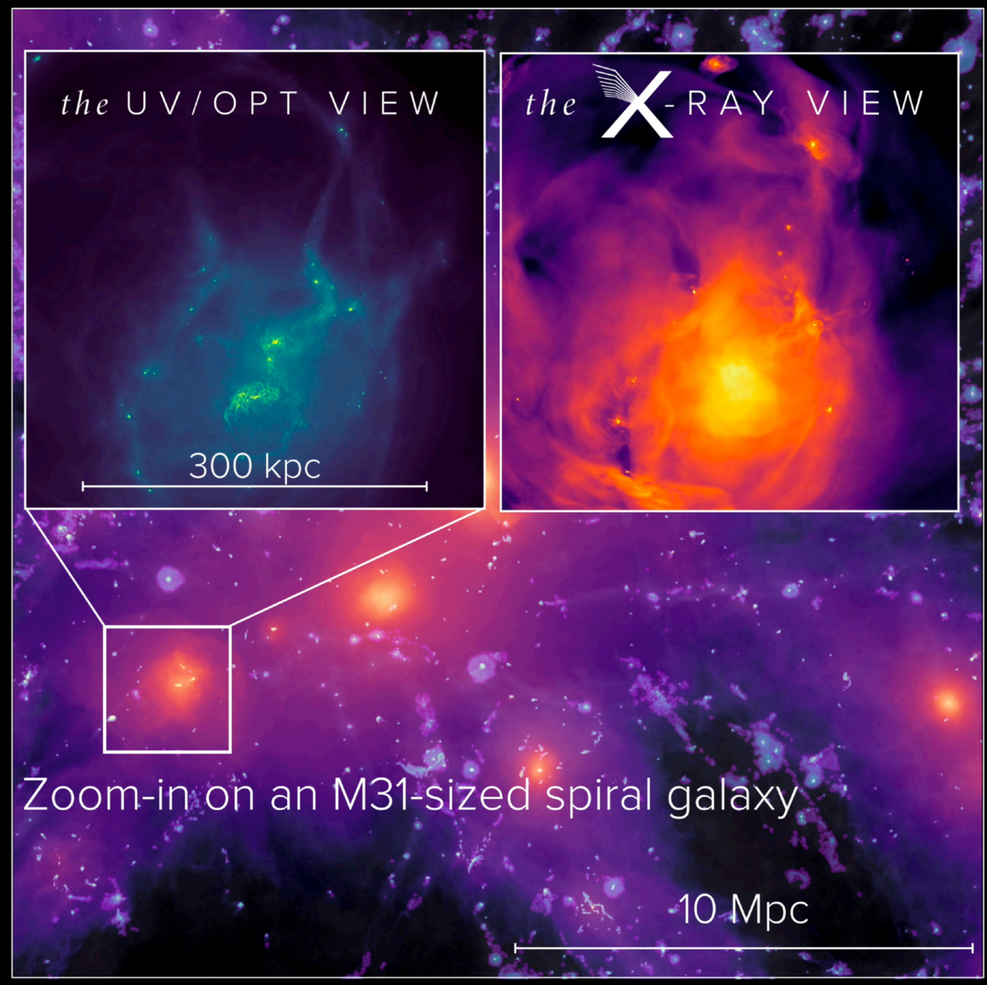
The SAG might envision, for example, three science pillars that map cleanly to Astro2020's three Science Priority Areas as well as NASA APD's "Big Three Questions"

ORIGIN & DESTINY OF THE COSMOS

ENGINES OF COSMIC CHANGE

THE STORY OF LIFE IN THE UNIVERSE





We could make many multiwavelength **figures of merit** for each pillar

THE NEW GREAT OBSERVATORIES
SCIENCE ANALYSIS GROUP

TERMS OF REFERENCE

To what degree can the Key Science Questions from Astro2020 be advanced by *contemporaneous flight* of current, imminent, and future IR/O/UV, X-ray, and FIR Great Observatories? What discoveries in the Astro2020 priority areas might *uniquely* be made possible by coordinated use of X-ray through FIR space observatories using powerful and varied instruments? How might gaps be closed by the notional future multi-scale and multi wavelength portfolio, including future explorers and probes?

In the scenario that any or all of these missions not be launched, or if any should not see contemporaneous flight with one another, what are the corresponding scientific impacts with regards to loss of discovery space or inability of the community to address the priority areas of Astro2020?

READ THE FULL CHARTER HERE

GAMMA RAY TRANSIENT NETWORK
SCIENCE ANALYSIS GROUP

A proposed **PhysPAG SAG** on InterPlanetary Networks (IPNs) and gamma-ray transients.

Chairs: Eric Burns & Michael Coughlin with broad & inclusive community participation

ABRIDGED TERMS OF REFERENCE

What time-domain and multi messenger sources rely on the InterPlanetary Network? What would be lost if the IPN ends?

Where can improvements be made to the existing IPN? What are the needs of the community, especially w.r.t. fast radio bursts, optically-identified relativistic transients, and the gravitational wave and neutrino communities?

What benefits would extending the IPN beyond the current gamma-ray instruments bring? What future missions and instruments are needed to fully realize the Decadal-recommended science in partnership with advancing capabilities in other wavelengths and other messengers?

READ THE FULL DRAFT CHARTER HERE

ASTROPHYSICS WITH EQUITY

SURMOUNTING OBSTACLES TO MEMBERSHIP

SCIENCE ANALYSIS GROUP

A proposed **Cross-PAG SAG** (aka AWESOM) on *increasing participation* in NASA Astrophysics.

SAG deliverables are one or more white papers on:

Analysis as to how existing NASA programs and potential new initiatives can **increase engagement with research and training programs**, and to make available opportunities **clearer, more consistent, and easier to access.**

How to expand the range of **institutions and backgrounds** for members of the community contributing to NASA astrophysics.

SAG membership open to any interested community member. SAG will specifically engage colleagues from BIPOC communities as well as those from institutions that are underrepresented in NASA research and education programs.

READ THE FULL DRAFT CHARTER HERE

NASA HQ & PROGRAM OFFICES

COMPETED WORK

INDUSTRY, ACADEMIA,
NASA CENTERS, SCIENCE CENTERS

NO EXCHANGE
OF FUNDS WORK

ACADEMIA, NASA CENTERS,
SCIENCE CENTERS

GOMAP HQ LEADERSHIP

INTERNATIONAL PARTNERS

GOMAP SUPPORT FROM PROGRAM OFFICES

GOMAP INTEGRATION GROUP

PROGRAMMATIC STRATEGY TEAM

SCIENCE STRATEGY TEAM

TECHNOLOGY STRATEGY TEAM

GOMAP LEADERSHIP

NASA HEADQUARTERS

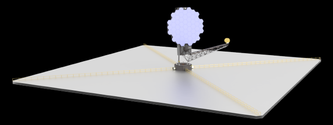
GOMAP SUPPORT FROM PROGRAM OFFICES

INTERNATIONAL PARTNERS

IR/O/UV OBSERVATORY INTEGRATION TEAM

CO-EQUAL

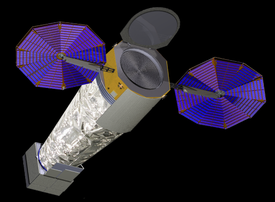
- **PROGRAMMATIC** STRATEGY TEAM
- **SCIENCE** STRATEGY TEAM
- **TECHNOLOGY** STRATEGY TEAM



IROUV GO SIG?

X-RAY OBSERVATORY INTEGRATION TEAM

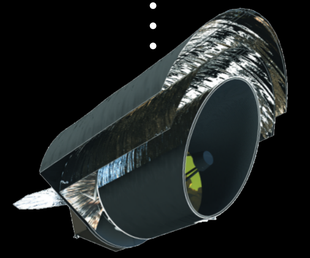
SCIENCE STRATEGY TEAM



X-RAY GO SIG?

FIR OBSERVATORY INTEGRATION TEAM

SCIENCE STRATEGY TEAM



FIR GO SIG?

TEAMS EMPOWERED TO DRIVE TECHNOLOGY DEVELOPMENT FUNDING, STUDY TRADES

THIS IS A TOTALLY NOTIONAL COMMUNITY IDEA